

Work Order ID 63747

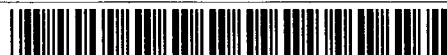
Friday, November 12, 2010 10:38:40 AM



Page 1

Item ID: D350-748-201

Accept



Setup Start



Revision ID:

Stop



Item Name: Crosstube Installation, High Aft

Start Date: 11/12/2010 Start Qty: 1.00



Cust Item ID:

Required Date: 11/26/2010 Req'd Qty: 1.00



Customer:

Reference:

Approvals: Process Plan: *PL*

Date: *10-11-12*

Tooling:

Date:

Run Start



QC:

Date:

SPC (Y/N):

Date:

Stop



Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
Draw Nbr	Revision Nbr								
D350-748-241	Rev E								
100		0.00							
	DOCUMENT CONTROL								
DC	Memo	0.00							
Document Control	Photocopy bluefile & type labels per PPPD350-748-201		CHG001	<i>S. W. L. 12/1</i>					<i>for BG 11-01-28</i>
110		0.00							
	BENDING MACHINE - CROSSTUBES								
CNC Bend 2	Memo	0.00							
CNC Alpha 160 Bender	Bend tube as per Dwg D350-748-241 using CNC bender program D350A and Folio FT _____			<i>DP</i>					<i>10-11-23</i>
120		0.00							
	QC15- Crosstube Dimensional Check								
QC	Memo	0.00							
Quality Control				<i>S. W. L. 12/3</i>					<i>FD</i>

W/O: 63747		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	
10.12.13	141	- DEFLECT TUBE TO 3600 ^{1/2} FOR 1 MINUTE - RE-MEASURE HEIGHT & WIDTH	JP	10.12.13	1	JP 10.12.13 DS 642	S. Smith	
10.12.13	142	NDT TUBE FOLLOWING DEFLECTION TEST				JP 10.12.13 DS 642	S. Smith	

Part No: D350-748-201 PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Work Order ID 63747

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Page 2

Item ID: D350-748-201

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Setup Start

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Item Name: Crosstube Installation, High Aft

Start Date: 11/12/2010 Start Qty: 1.00

Cust Item ID:

Required Date: 11/26/2010 Req'd Qty: 1.00



Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____
QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Run Start

Stop

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
125		0.00							
	HandFXtube	0.00							
Hand Finishing Crosstubes	Memo ***Stress relief*** Heat treat crosstube as per QSI010 4.3 Temp: <u>375</u> Start time: <u>2h00</u> Finish time: <u>5:30pm</u>								
			SAP 10-11-23						
127	QC5- Inspect part completeness to step on W/O	0.00							
	QC	0.00							
Quality Control	Memo								

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod.Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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Start Date: 11/12/2010 Start Qty: 1.00



Cust Item ID:

Required Date: 11/26/2010 Req'd Qty: 1.00



Customer:

Reference:

Run Start



Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Stop



QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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130



Crosstubes

Crosstubes

Crosstubes

Memo

0.00

0.00

1-Drill Tube as per Dwg D350-748-241 Using DT8876 Drill Jigs,
Set-up drill table as per QSI 010

2-Deburr

3-Engrave Part # and Batch # as per Dwg D350-748-241

4-Remove all marks from tube within limits of D350-748-241

5- Apply a light coat of LPS3 on the interior of tube
Batch: _____

140



QC

Quality Control

QC6- Inspect dimensions to drawing

0.00

0.00

Memo

Handwritten notes:
SAD 10-12-01
SAD 10-11-29

See Attached E-mail

P10 on Back of 1st Page

Centsource NDT

Issue P10: to acumen

CL1012109 ①

*Back: ensure copy of NDT results read
attached to WIO*

Handwritten signature

W/O: 63747		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
10/12/09	175	NDT per QSI 038 before + after load testings per eng. this time only P/O: 13113	CL	10/12/09	①	h 12/12/09	
		rec'd + inspect	h	11/12/09	①	h	

Part No: D350-748-201 PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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Start Date: 11/12/2010 Start Qty: 1.00

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Required Date: 11/26/2010 Req'd Qty: 1.00

Customer:

Reference:

Run Start

Approvals: Process Plan: Date: Tooling: Date:

Stop

QC: Date: SPC (Y/N): Date:

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

150

Outsource process-Cadplate per QSI017 4.1.9.1

0.00



Outsource3

Memo

0.00

Outsource process - Cad plate

Issue P/O: 13128
Stress relief at 375° for 5 hours
Magnetic Particle Inspect per ASTM E1444
Cadium Plate per AMS-QQ-P-416B, Class 1, Type 2
Embrittle relief at 375° for 8 hours, Chromate Treat
Possible Supplier: Southwest United Industries
Ensure Certificate of Conformity is attached

CZ 10/12/14 ①

160

Receive & Inspect for Damage & Mat'l Certs

0.00



Packaging

Memo

0.00

Packaging

Ensure certificate of conformity is attached

CZ 11/12/14 ①

170

QC5- Inspect part completeness to step on W/O

0.00



QC

Memo

0.00

Quality Control

11/6/14 / 11.01.29

Spec = 81.480"
twist = .527" issued 10/26/14 per ASTM 1417 level 2 HPI as per QSI 038
P/O: 13367 CZ 11/01/14 ①

11/26/14

rec'd + inspect + attached CofC to W/O

W/O:		WORK ORDER CHANGES					
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Required Date: 11/26/2010 Req'd Qty: 1.00



Customer:

Reference:

Run Start



Approvals: Process Plan: Date: Tooling: Date:

Stop



QC: Date: SPC (Y/N): Date:

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

180

0.00



SprayPaint

SprayPaint

Memo

0.00

Spray Painting

1-Prime inside crosstube as per QSI 005 4.2
2-Paint Outside of Tube as per Dart QSI 005 4.225 11-01-26

190

0.00



QC14- Inspect Spray Paint

QC

Memo

0.00

Quality Control

Then, Wrap in plastic bag to protect from scratches

ml 11 01 27 (1)

200

0.00



Crosstubes

Crosstubes

Memo

0.00

Crosstubes

1-Install Ground wire Insert, then insert screw and washer
2-Install Abrasion strips as per Dwg D350-748-241 & QSI 035.
3-Install supports Using Dt8876 as per Dwg D350-748-241, Torque to 60-80 IN-LBSml 11 01 28 (1)

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Cust Item ID:

Required Date: 11/26/2010 Req'd Qty: 1.00

Customer:




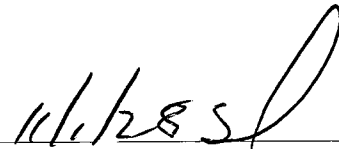


Reference:

Run Start

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Stop

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
210  QC Quality Control	QC5- Inspect part completeness to step on W/O Memo	0.00 0.00							
220  Packaging Packaging	Pick Kit Memo	0.00 0.00							
230  QC Quality Control	QC4- 100% Inspect kits for completeness Memo	0.00 0.00							

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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Revision ID:

Item Name: Crosstube Installation, High Aft





Start Date: 11/12/2010 Start Qty: 1.00

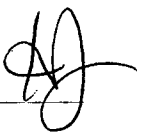
Required Date: 11/26/2010 Req'd Qty: 1.00

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____
QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Run Start
Stop

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
240		0.00							
	Packaging								
Packaging	Memo	0.00							
Packaging	Identify and pack for shipping as per PPPD350-748-201								
	Location: 								
	PPP Rev: 								
250	QC21- Final Inspection - Work Order Release	0.00							
									
QC	Memo	0.00							
Quality Control									

11/02/02 
MT
11-0201

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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NOTE: Date & initial all entries

Picklist Print

Page 1

Friday, November 12, 2010 10:38:44 AM

Work Order ID: 63747



Parent Item: D350-748-201



Parent Item Name: Crosstube Installation, High Aft

Start Date: 11/12/2010

Required Date: 11/26/2010

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev: A New Issue 06-07-05 JLM
 IPP Rev: B Update qty of MS21042L5 06-09-12 KJ
 IPP Rev C Combined manufacturing 08.04.02 EC verified by: DD
 IPP Rev:D 08-06-24 revD as per dwg DD verified by:EC
 IPP Rev: E 08.12.11 Step17 was step 21 KJ Verified by:EC IPP Rev:F
 10.08.04 added QSI010 4.3 DD verf:EC

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
---------------------------------	------------------------	---------------	-------------	---------------------	------------------	-----------------	--------------------	----------------	-------------	--------------	---------------	----------------	--------

D350-748-241TRN		Manufactured	No			110	Each	3.0000	1	1			
Crosstube Turning Detail													

Location	Loc Qty	Loc Code
LG	3	B59552
59549	1	
59551	1	
59587	1	

ALS4-1032-225		Purchased	No			200	Each	4,520.000	1	1			
Insert													

Location	Loc Qty	Loc Code
PK011	4520	
110768	4520	

AN960JD10	NAS1149D0363J	Purchased	No			200	Each	8.0000	1	1			
Washer													

B# 116025

Location	Loc Qty	Loc Code
ST	6	
107715	6	
ST335	2	
105792	2	

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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Friday, November 12, 2010 10:38:44 AM

Work Order ID: 63747

Parent Item: D350-748-201

Parent Item Name: Crosstube Installation, High Aft

Start Date: 11/12/2010

Required Date: 11/26/2010

Start Qty: 1.00

Required Qty: 1.00

D2856-400 Manufactured No

200 f

123.8130 1.181 1.243158



Abraison Strip

63735

Location

Loc Qty

Loc Code

ST403

123.8130421

56626

0.00004211

59920

123.813

1- cut as per dwg D2856

D3502-1 Manufactured No

200 Each

48.0000 2 2



Support

Location

Loc Qty

Loc Code

ST063

24

61206

12

61843

12

ST066

24

50287

23

52903

1

MS21920-20 Purchased No

200 Each

57.0000 2 2



Clamp (per MIL-DTL-8783C)

Location

Loc Qty

Loc Code

LG

57

112624

2

114687

1

115057

4

115736

50

Friday, November 12, 2010 10:38:44 AM

Shop Packet Print

Page 2

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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Work Order ID: 63747

Parent Item: D350-748-201

Parent Item Name: Crosstube Installation, High Aft

Start Date: 11/12/2010

Required Date: 11/26/2010

Start Qty: 1.00

Required Qty: 1.00

MS27039-1-10

Purchased

No

200

Each

131.0000

1

1



Screw



11.01.28

Location

Loc Qty

Loc Code

ST291

131

112794

3

112940

28

115935

100

Purchased

No

220

Each

252.0000

8

8

AN4-41A



Bolt



11/1/28

Location

Loc Qty

Loc Code

ST360

252

111424

4

113359

1

114941

57

115108

100

115374

40

115705

50

Purchased

No

220

Each

952.0000

16

16

AN4-6A



Bolt



11/1/28

Location

Loc Qty

Loc Code

ST356

952

112933

96

113149

17

115108

139

115457

500

115936

200

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

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Picklist Print

Page 4

Friday, November 12, 2010 10:38:44 AM

Work Order ID: 63747

Parent Item: D350-748-201

Parent Item Name: Cross tube Installation, High Aft

Start Date: 11/12/2010

Required Date: 11/26/2010

Start Qty: 1.00

Required Qty: 1.00

AN5-32A

Purchased

No

220

Each

252.0000

4 4



Bolt

Location

Loc Qty

Loc Code

ST340

252

114405

42

115016

50

115108

50

115589

60

115698

50

AN960JD416

NAS1149D0463J

Purchased

No

220

Each

24.0000

32 32



Washer

Location

Loc Qty

Loc Code

ST300

24

113288

24

AN960JD516

NAS1149D0563J

Purchased

No

220

Each

34.0000

8 8



Washer

Location

Loc Qty

Loc Code

ST

34

103694

18

107534

12

109287

4

D3500-1

Manufactured

No

220

Each

31.0000

4 4



Saddle

Location

Loc Qty

Loc Code

ST424

31

55605

2

60489

4

61650

25

Friday, November 12, 2010 10:38:44 AM

Shop Packet Print

Page 4

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Parent Item Name: Crosstube Installation, High Alt

Start Date: 11/12/2010

Required Date: 11/26/2010

Start Qty: 1.00

Required Qty: 1.00

S D3501-1
Bushing

Manufactured No

220 Each

410.0000



16

16

11/12/2010

Location

Loc Qty

Loc Code

ST066

410

45402

15

45918

112

48268

3

53779

20

61196

100

61837

60

61984

100

16

S MS21042L4
Nut

Purchased No

220 Each

2,556.000



24

24

11/12/2010

Location

Loc Qty

Loc Code

ST300

2556

113422

25

114523

8

115589

1423

115621

1100

S MS21042L5
Nut

Purchased No

220 Each

1,389.000



4

4

11/12/2010

Location

Loc Qty

Loc Code

ST139

26

114813

26

ST300

1363

115156

163

115594

500

116104

200

116105

500

4

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

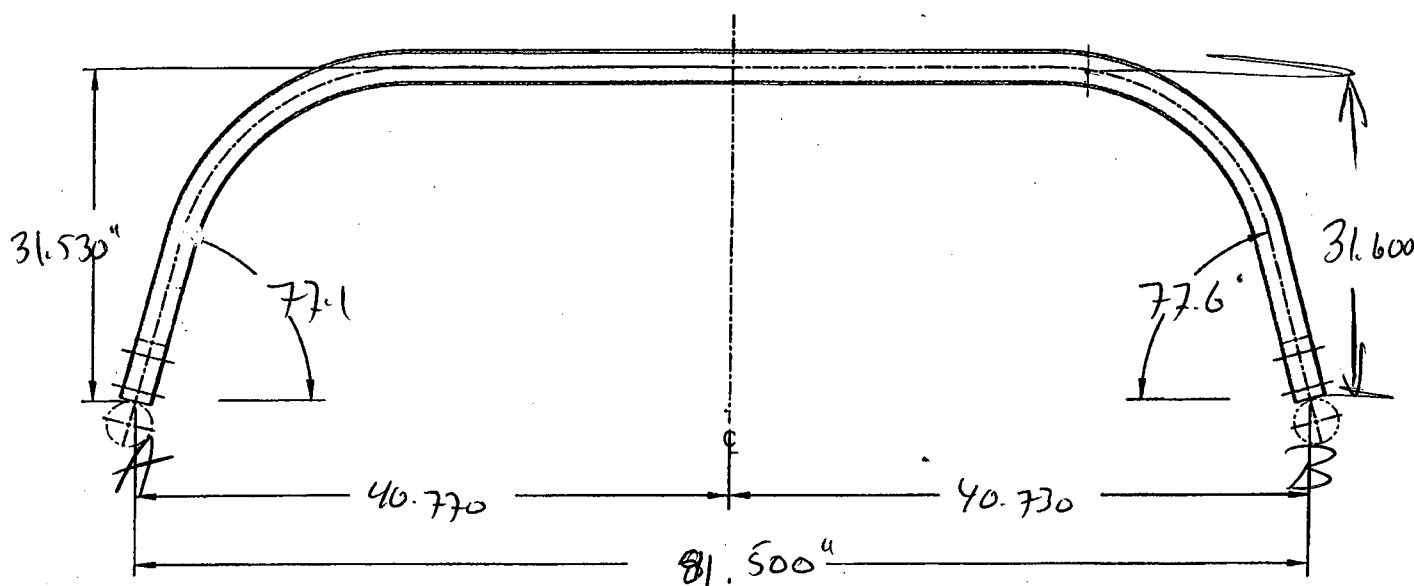
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NOTE: Date & initial all entries

DART AEROSPACE LTD		Work Order:	63747
Description: Crosstube High Aft (AS350/355)		Part Number:	D350-748-201
Inspection Dwg: D350-748-241 Rev: E		Page 1 of 1	

Required Dimension	Min	Max
Height	31.22	31.48
1/2 Span	40.77	41.03
Angle	75	77
Total Span	81.54	82.06



Comments
twist = 0.481" OK 10.11.23

QC15 Inspection	8/10/14/23
Date	8/10/14/23

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

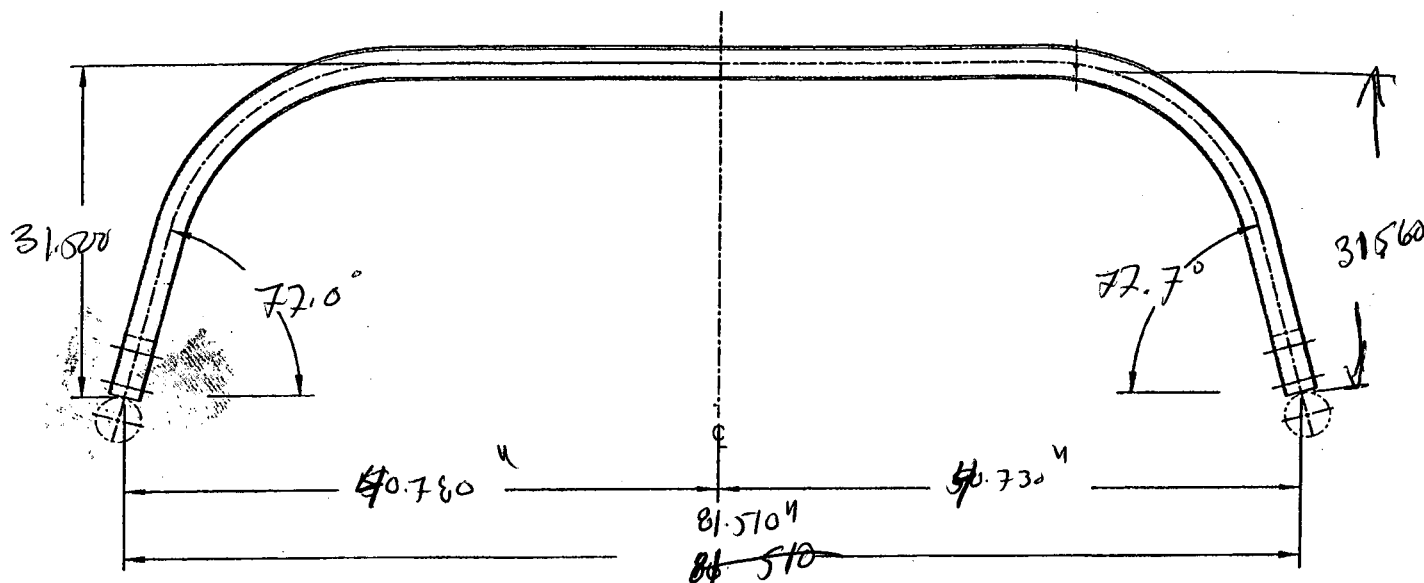
Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

DART AEROSPACE LTD		Work Order:	
Description: Crosstube High Aft (AS350/355)		Part Number:	D350-748-201
Inspection Dwg: D350-748-241 Rev: E		Page 1 of 1	

Required Dimension	Min	Max
Height	31.22	31.48
1/2 Span	40.77	41.03
Angle	75	77
Total Span	81.54	82.06



Comments
Twist .475" OK 10.11.24
Re measured after stress relief.

QC15 Inspection	S
Date	10/16/24

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	

Item	Qty -241	Part Number	Description
1	X	D350-748-241	CROSSTUBE ASSEMBLY (AS 350/355 HI AFT)
2	1	D6018-125	CROSSTUBE
3	2	D3502-1	SUPPORT
4	2	D2856-400-710	ABRASION STRIP
5	1	AELS-1032-225	INSERT
6	1	NAS1149D0363J	WASHER (OR AN960JD10)
7	2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
8	1	MS27039-1-10	SCREW

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6018-125
FINISHED LENGTH = 122.700±0.06
- 2) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2
CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: SCRIBE DART PART NUMBER "D350-748-241" AND BATCH NUMBER ON INSIDE OF CUFF USING VIBRATING STYLUS.
- 7) WEIGHT: 29.85 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.297 HOLE.
- 9) RUN CUTTER OFF PART WHERE INDICATED. BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER BENDING.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 11) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING.
- 12) INSTALL D2856-400-710 ABRASION STRIPS WITH A GAP ON BOTTOM SIDE OF CROSSTUBE, CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
- 13) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO CRACKING/CHIPPING/GROOVES.
- 14) TORQUE CLAMPS 60 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

SHOP COPY
RETURN TO
ENGINEERING
UNCONTROLLED COPY
SUBJECT TO AMENDMENT
WITHOUT NOTICE
WORK ORDER
NO. 63747

BS-0-11-15

OK 9/10.11.15

UNDER REVIEW

10.10.13

RELEASED
2009-10-29

E	REVISE GENERAL NOTES: UPDATE TO CURRENT STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN A8-3); ADD TOLERANCES (ZN C6-3, D2-3)	RF	09.09.30
D	MAG. PARTICLE AND CAD PLATE AS MFD.	CP	06.10.31
C	ADD CAD PLATING	CP	06.08.14
B	ADD D6018-125 & PRIME AND PAINT	CP	06.06.30
A	NEW ISSUE	CP	06.03.31
REV.	DESCRIPTION	BY	DATE
DESIGN	<i>9</i>	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
DRAWN	RF		
CHECKED	<i>9</i>	DRAWING NO.	REV. E
MFG. APPR.	<i>15</i>	D350-748-241	SHEET 1 OF 4
APPROVED	<i>15</i>	TITLE	SCALE
DE APPR.	<i>15</i>	CROSSTUBE (AS 350/355 HI AFT)	NTS
DATE	09.09.30	COPYRIGHT © 2005 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR REPRODUCED IN ANY FORM OR BY ANY MEANS WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	

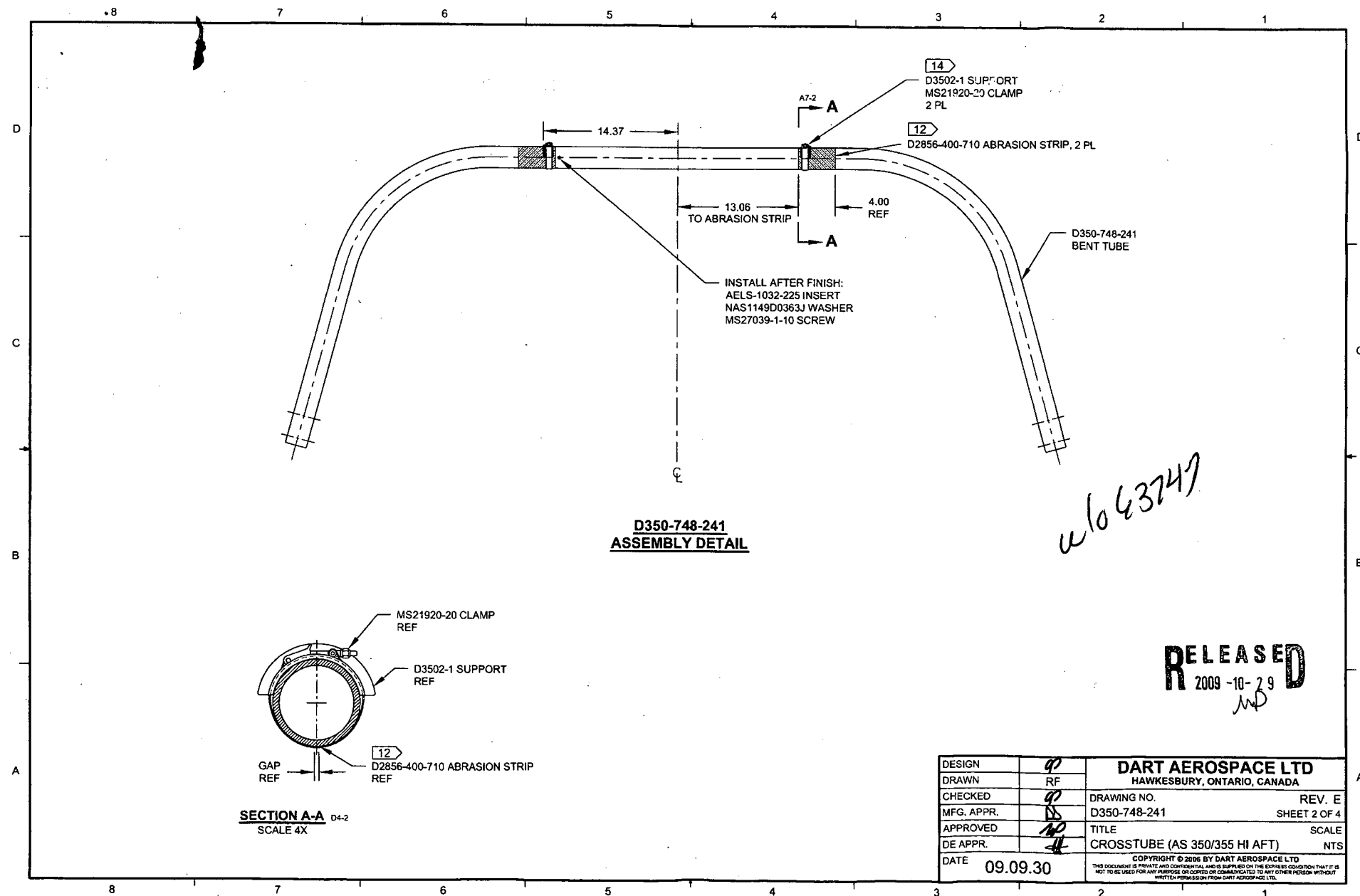
W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries



RELEASED
2009-10-29
MD

DESIGN	9P	DART AEROSPACE LTD	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	9P	DRAWING NO.	REV. E
MFG. APPR.	SS	D350-748-241	SHEET 2 OF 4
APPROVED	12	TITLE	SCALE
DE APPR.	12	CROSSTUBE (AS 350/355 HI AFT)	NTS
DATE	09.09.30	<small>COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR DISCLOSED OR REPRODUCED IN ANY MANNER WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.</small>	

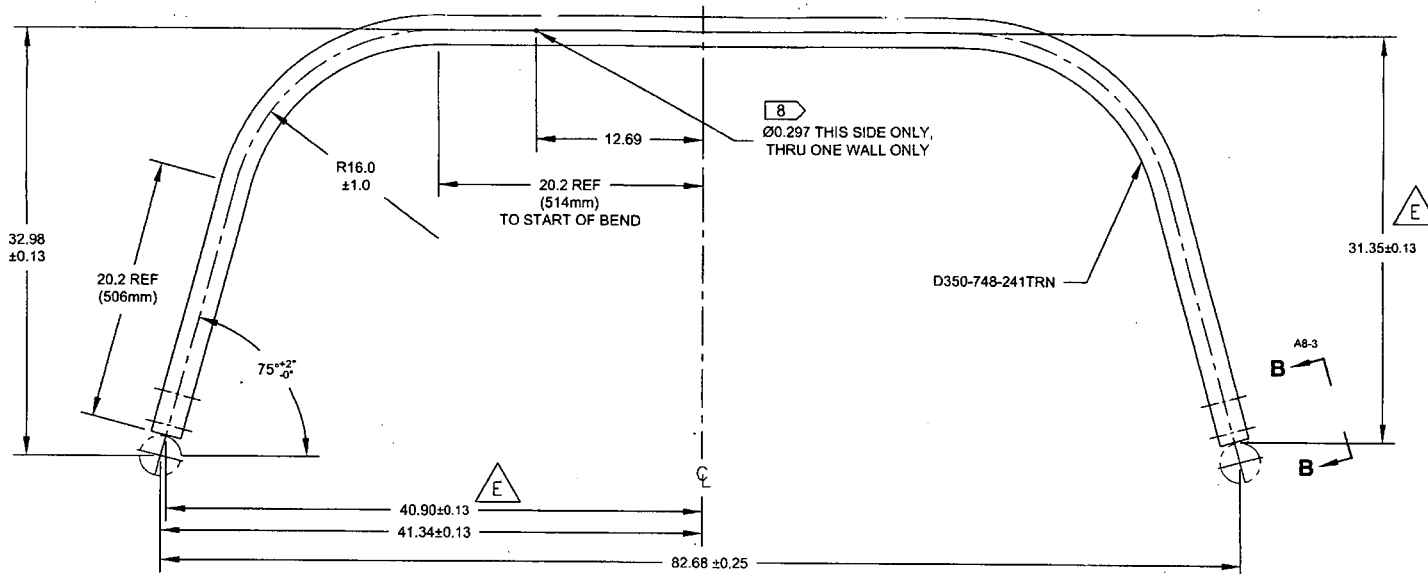
W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

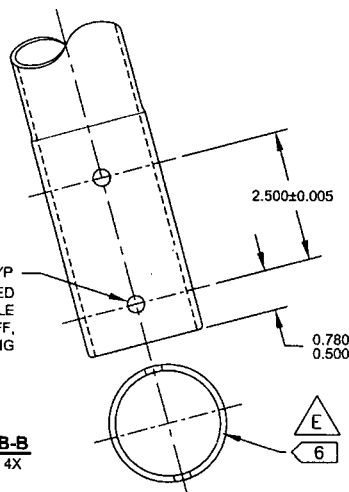


D350-748-241
BENDING AND DRILLING DETAIL 10

w/b 63747

Ø0.323^{+0.005}_{-0.000} THRU, TYP
 HOLE TO BE ALIGNED
 WITHIN ±0.001 OF HOLE
 ON OTHER SIDE OF CUFF,
 TO BE DRILLED AFTER BENDING

C2-3 **VIEW B-B**
 SCALE 4X



RELEASED
 2009-10-29

DESIGN	97	DART AEROSPACE LTD	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	97	DRAWING NO.	REV. E
MFG. APPR.	DS	D350-748-241	SHEET 3 OF 4
APPROVED	142	TITLE	SCALE
DE APPR.	14	CROSSTUBE (AS 350/355 HI AFT)	NTS
DATE	09.09.30	COPYRIGHT © 2006 BY DART AEROSPACE LTD	
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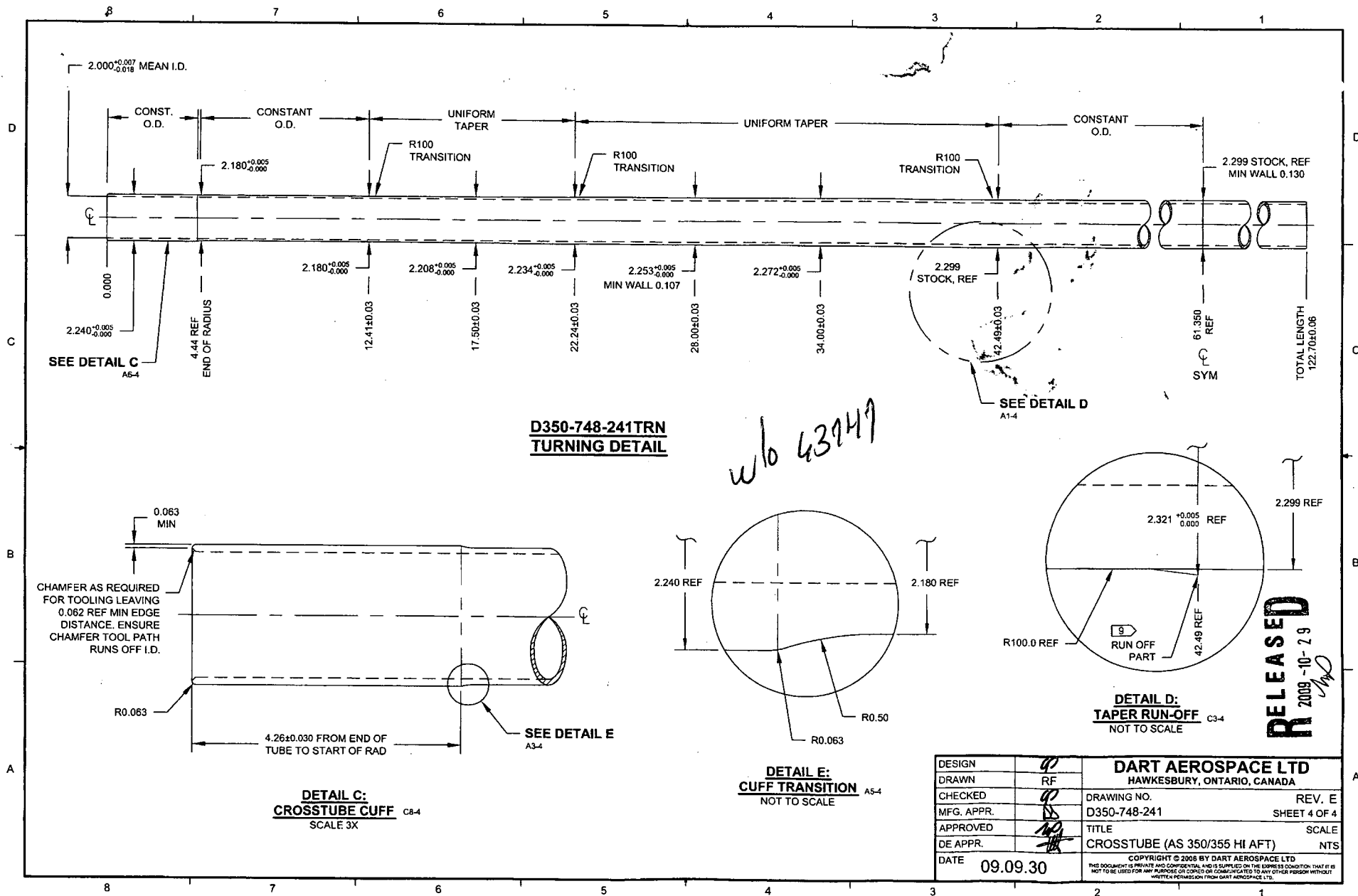
W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries



D350-748-241TRN
TURNING DETAIL

DETAIL D:
TAPER RUN-OFF
NOT TO SCALE

DETAIL C:
CROSSTUBE CUFF C8-4
SCALE 3X

DETAIL E:
CUFF TRANSITION A5-4
NOT TO SCALE

DESIGN	RF	DART AEROSPACE LTD	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	RF	DRAWING NO.	REV. E
MFG. APPR.	RF	D350-748-241	SHEET 4 OF 4
APPROVED	RF	TITLE	SCALE
DE APPR.	RF	CROSSTUBE (AS 350/355 HI AFT)	NTS
DATE	09.09.30	<small>COPYRIGHT © 2008 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.</small>	

RELEASED
2009-10-29

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

L Lacelle

From: David Shepherd [dshepherd@dartaero.com]
Sent: May 11, 2010 12:37 PM
To: 'L Lacelle'; 'Mike Petsche'
Cc: 'Bill Beckett'; 'Chris Provencal'; 'Dan Stow'; ssheldon@dartaero.com; 'Chantal Lavoie'
Subject: RE: 350 crosstubes

Linda,

As discussed, if the tubes have been structurally tested, it has been documented on the work orders, and Chris has signed off on them, then it is acceptable to me to release the parts.

David

From: L Lacelle [mailto:llacelle@dartaero.com]
Sent: Tuesday, May 11, 2010 8:37 AM
To: 'David Shepherd'; 'Mike Petsche'
Cc: 'Bill Beckett'; 'Chris Provencal'; 'Dan Stow'; ssheldon@dartaero.com; 'Chantal Lavoie'
Subject: RE: 350 crosstubes

Now that testing is done, can we ship out the batch that as been ready to heat treat?

LL

From: David Shepherd [mailto:dshepherd@dartaero.com]
Sent: April 27, 2010 3:40 PM
To: 'Mike Petsche'
Cc: 'Bill Beckett'; 'L Lacelle'; 'Chris Provencal'; 'Dan Stow'; ssheldon@dartaero.com
Subject: 350 crosstubes

Mike,

I discussed the 350 crosstube load testing with Bill a little while ago and this plan makes sense to him.

So, my recommendation to clear these crosstubes is to load the fwd crosstubes to 3500 lb and the aft crosstubes to 3000 lb in the deflection test rig and document on the work orders that this test has been completed. Hold max load for 1 minute. Per TP-D350-748-2, these loads represent the maximum load on these crosstubes at gross weight and are below the yield point of the material. I would like to request that Chris Provencal witness these tests and sign off the work orders based on his experience with Dart landing gears. My feeling is that if there is a problem with the parts, it will manifest itself during this load test. I, for one, would feel a lot more confident in testing each crosstube in this manner than relying totally on what Exova has to say. I think it would be very difficult to reach a conclusion on the whole batch on the basis of cracks in two parts from the batch.

I believe that we can accomplish this before next Friday, which also gives us time to hear what Exova has to say in case it has an impact on our decision. So far, what I have seen from Exova shows me that there are fluctuations in the heat treating but the tubes are heat treated to our specification.

For this reason, I believe we should tell DHS that it looks like we will be able to start shipping 350 crosstubes by May 7th pending a successful Engineering test of the material.

David.

No virus found in this incoming message.

Checked by AVG - www.avg.com

Version: 8.5.437 / Virus Database: 271.1.1/2865 - Release Date: 05/11/10 06:26:00

12/06/10



LIQUID PENETRANT TEST REPORT

P- 05492

CLIENT: ART AEROSPACE DATE: Dec 9/2010 TIME: AM ☒ PM ☐
ATTENTION: LINDA KACELLE/MAINTENANCE ACUREN JOB NO.: 183-10-C987
ADDRESS: 1270, ALBER DEEN PO/NO No.:
HALUKES BURY, ON WORK LOCATION: AS ADDRESS
ACCEPTANCE STD: ASIM 1417/051038 REV./DATE: 2005
PROJECT: Liquid Penetrant Inspection on "CRSSTUBE" HIGH AFT
ITEM(S) EXAMINED: SEE W.O. # IN RESULTS

JOB DESCRIPTION: PROCEDURE NO. LT-003 REV./DATE: 2008 TECHNIQUE NO. LT-003 REV./DATE: 2008
PART NO.: MATERIAL: AL30 THICKNESS: N/A
SCOPE: PERFORMED A WET FLO INSPECTION BY LIQUID PENETRANT ON 100% OF THE EXTERNAL SURFACE

TEST DETAILS			
METHOD	<input checked="" type="checkbox"/> FLUORESCENT	<input type="checkbox"/> VISIBLE	<input checked="" type="checkbox"/> WATER WASH
FAMILY BRAND	<u>MAGNAFLUOR</u>		
PENETRANT	<u>ZK-67</u>	MINIMUM DWELL TIME	10 MIN.
PENETRANT REMOVER	<u>H2O</u>	MINIMUM DRY TIME	>10 MIN.
DEVELOPER	<u>SKD-32</u>	MINIMUM DWELL TIME	10 MIN.
DEVELOPER TYPE	<input type="checkbox"/> NON AQUEOUS	<input type="checkbox"/> AQUEOUS	<input type="checkbox"/> DRY

TEST SURFACE
SURFACE CONDITION: ☐ AS GROUND ☐ AS WELDED ☐ MACHINED ☐ SHOT BLASTED ☒ CLEAN BARE METAL
SURFACE TEMPERATURE: ☐ < -4°C/ 20°F ☐ -4°C/ 20°F TO 10°C/50°F ☒ 10°C/50°F TO 52°C/125°F ☐ > 52°C/125°F

RESULTS- (<input type="checkbox"/> METRIC <input checked="" type="checkbox"/> IMPERIAL)			
#	ITEMS	CRSSTUBE - W.O. ID	ITEM ID
1	1	63746	✓
2	2	63747	✓
3	3	63748	✓
4	4	63749	✓
5	5	61763	✓
6	6	61764	✓
7	7	61765	✓
8	8	61766	✓
B A 4 SEE NOTE →			B A
ITEMS			ACC. REG.
5X MOUNTS - W.O. ID 61890			✓

NOTE: B = BEFORE DEFLATION TEST
A = AFTER DEFLATION TEST
ITEM ID: D350-748-301 (ITEMS #1, 2, 3, 4)
ITEM ID: D350-748-101 (ITEMS #5, 6, 7, 8)
ITEM ID: D3687-3 (MOUNTS)

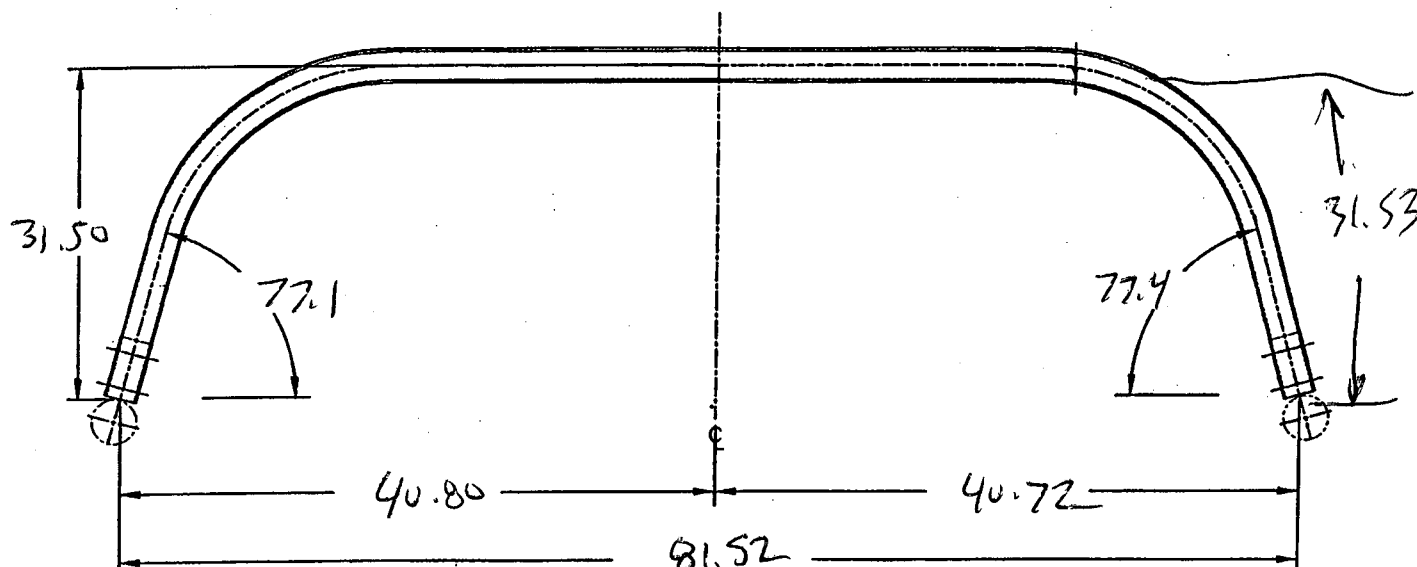
Scope of Services
The agreement of Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is expressly understood that all descriptions, comments and expressions of opinion reflect the opinions or observations of Acuren Group Inc. based on information and assumptions supplied by the owner/operator and are not intended nor can they be construed as representations or warranties. Acuren Group Inc. is not assuming any responsibilities of the owner/operator and the owner/operator retains complete responsibility for the engineering, manufacture, repair and use decisions as a result of the data or other information provided by Acuren Group Inc. In no event shall Acuren Group Inc.'s liability in respect of the services referred to herein exceed the amount paid for such services.
Standard of Care
In performing the services provided, Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, expressed or implied, is made or intended by Acuren Group Inc.

SIGNATURES

CLIENT REPRESENTATIVE: <u>John Tolley</u>	DTR # <u>E63107</u>
TECHNICIAN (SIGNATURE): <u>[Signature]</u>	REPORT REVIEWED BY:
NAME (PRINT): <u>VES DESKISZKI</u>	NAME INITIALS
1 ST TECHNICIAN: CGSB LEVEL <u>3</u> SNT LEVEL <u>2</u> CGSB REG. NO. <u>3049</u>	2 ND TECHNICIAN: CGSB LEVEL <u>-</u> SNT LEVEL <u>-</u> CGSB REG. NO. <u>-</u>

DART AEROSPACE LTD		Work Order:	63747
Description: Crosstube High Aft (AS350/355)		Part Number:	D350-748-201
Inspection Dwg: D350-748-241 Rev: E		Page 1 of 1	

Required Dimension	Min	Max
Height	31.22	31.48
1/2 Span	40.77	41.03
Angle	75	77
Total Span	81.54	82.06



Comments
- FOLLOWING DEFLECTION TEST
- ACCEPTABLE 10.12.13

QC15 Inspection	10.12.13
Date	

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	

**CERTIFICATE OF
CONFORMANCE**

**CADORATH PLATING CO. LTD.
2150 LOGAN AVENUE
WINNIPEG, MANITOBA R2J-0J1**

DATE: Jan-14-2011

CONSIGNEE TO: Dart Aerospace Ltd.
1270 Aberdeen St.
Hawksbury, ON K6A 1K7

W/O #: 100756

INVOICE #: 52907

**CONTRACT OR
PURCHASE ORDER #**

PO13128

DESCRIPTION: SKID

QTY 1

P/N # D350-748-201

S/N # B63747

**STRESS RELIEF BAKE @375 DEG. BAKE HEAT CHART #10-1335.
MPI INSPECTED IAW ASTM-E-1444. CADMIUM PLATED IAW AMS-
QQ-P-416C, TYPE 2 YELLOW, CLASS 1. BAKE HEAT CHART #11-5.**

Suloc/zy

**CERTIFICATE: I certify that the items indicated here on have
been inspected and tested and conform to all specifications
and requirements detailed on the contract or purchase order.**

Approved Inspector:



[Handwritten signature]



LIQUID PENETRANT TEST REPORT

P- 05496

CLIENT

ATTENTION

ADDRESS

PROJECT

ITEM(S) EXAMINED

DATE

ACUREN JOB NO.

PO/VO NO.

WORK LOCATION

ACCEPTANCE STD.

PAGE

1 OF 2

TIME

AM

PM

DART AEROSPACE
LINDA LACELLE / CHANTAKE / IAN
1270, ABERDEN ST.
HAWKESBURY, ON

JAN/26/2011
188-11-

AS ADDRESS

ASTM1417/GST-038 REV./DATE 2005
WET FLUO PENETRANT INSPECTION ON 14 "CROSSTUBES"; 4 "COLLECTIVE BELL CRACK"

SEE BELOW

JOB DESCRIPTION

PROCEDURE NO. LT-002 REV./DATE 2008

TECHNIQUE NO. LT-002

REV./DATE 2008

PART NO.

MATERIAL

ALODINE ALUMINUM

THICKNESS

N/A

SCOPE

PERFORMED A WET FLUORESCENT LIQUID PENETRANT INSPECTION ON
100% OF THE EXTERNAL SURFACE

TEST DETAILS

METHOD	<input checked="" type="checkbox"/> FLUORESCENT	<input type="checkbox"/> VISIBLE	<input checked="" type="checkbox"/> WATER WASH	<input type="checkbox"/> SOLVENT REMOVABLE	<input type="checkbox"/> POST EMULSIFIED
AMILY BRAND	MAGDA FLUX		BLACK LIGHT S/N 13798	OUTPUT > 1000 μ W/cm ²	AMBIENT < 2 fc
ENETRANT	Z6-67	MINIMUM DWELL TIME 10 MIN.	LIGHTING EQUIP.	<input type="checkbox"/> FLASHLIGHT	<input type="checkbox"/> TROUBLELIGHT
ENETRANT REMOVER	H ₂ O	MINIMUM DRY TIME >10 MIN.	OTHER		OUTPUT > 100 fc @ SURFACE
DEVELOPER	SKD-S2	MINIMUM DWELL TIME 10 MIN.	LIGHT METER S/N		CAL DUE DATE 6/2/2011
DEVELOPER TYPE	<input checked="" type="checkbox"/> NON AQUEOUS	<input type="checkbox"/> AQUEOUS	<input type="checkbox"/> DRY		

TEST SURFACE

SURFACE CONDITION	<input type="checkbox"/> AS GROUND	<input type="checkbox"/> AS WELDED	<input type="checkbox"/> MACHINED	<input type="checkbox"/> SHOT BLASTED	<input checked="" type="checkbox"/> CLEAN BARE METAL
SURFACE TEMPERATURE	<input type="checkbox"/> < -4°C/ 20°F	<input type="checkbox"/> -4°C/ 20°F TO 10°C/50°F	<input checked="" type="checkbox"/> 10°C/50°F TO 52°C/125°F	<input type="checkbox"/> > 52°C/125°F	

RESULTS-

☐ METRIC ☒ IMPERIAL

ITEM	COMMENTS	ACCEPT	REMARKS
1	4X "COLLECTIVE BELL CRACK"	✓	→ NOID 64913 → ITEM ID: - D350-748-101 (H.F.)
2	CROSS-TUBE W.O. ID 63591	✓	→ ITEM ID: - D350-748-101 (H.F.)
3	CROSS-TUBE W.O. ID 63592	✓	→ ITEM ID: - D350-748-101 (H.F.)
4	CROSS-TUBE W.O. ID 63746	✓	→ ITEM ID: - D350-748-201 (H.A.)
5	CROSS-TUBE W.O. ID 63747	✓	→ ITEM ID: - D350-748-201 (H.A.)
6	CROSS-TUBE W.O. ID 63748	✓	→ ITEM ID: - D350-748-201 (H.A.)
7	CROSS-TUBE W.O. ID 63749	✓	→ ITEM ID: - D350-748-201 (H.A.)

SEE Page 2 of 2 85 11-01-26

Scope of Services
The agreement of Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is expressly understood that all descriptions, comments and expressions of opinion reflect the opinions or observations of Acuren Group Inc. based on information and assumptions supplied by the owner/operator and are not intended nor can they be construed as representations or warranties. Acuren Group Inc. is not assuming any responsibilities of the owner/operator and the owner/operator retains complete responsibility for the engineering, manufacture, repair and use decisions as a result of the data or other information provided by Acuren Group Inc. In no event shall Acuren Group Inc.'s liability in respect of the services referred to herein exceed the amount paid for such services.

Standard of Care
In performing the services provided, Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, expressed or implied, is made or intended by Acuren Group Inc.

SIGNATURES

CLIENT REPRESENTATIVE

Ian Titley

DTR # E63/21

TECHNICIAN (SIGNATURE):

YVES DESROSIERS
1ST TECHNICIAN

SIGNATURE

REPORT

REVIEWED BY:

NAME (PRINT):

NAME

INITIALS

CGSB LEVEL

SNT LEVEL

CGSB REG. NO.

3049

CGSB LEVEL

SNT LEVEL

CGSB REG. NO.

8
REFERENCE ONLY

5.0 PARTS LIST

Qty -101	Qty -201	Part Number	Description
X		D350-748-101	CROSSTUBE INSTALLATION, AS 350/355 HIGH FWD
	X	D350-748-201	CROSSTUBE INSTALLATION, AS 350/355 HIGH AFT
1		D350-748-141	CROSSTUBE ASSEMBLY, AS 350/355 HIGH FWD
	1	D350-748-241	CROSSTUBE ASSEMBLY, AS 350/355 HIGH AFT
*2	*2	D3502-1	SUPPORT
*2	*2	D2856-400-710	ABRASION STRIP
*1	*1	AELS-1032-225	INSERT
*2	*2	MS21920-20	CLAMP
*1	*1	MS27039-1-10	SCREW
*1	*1	AN960JD10	WASHER
4	4	D3500-1	SADDLE
16	16	D3501-1	BUSHING
16	16	AN4-6A	BOLT
8	8	AN4-41A	BOLT
4	4	AN5-32A	BOLT
32	32	AN960JD416	WASHER
8	8	AN960JD516	WASHER
24	24	MS21042L4	NUT (OR MS21042-4)
4	4	MS21042L5	NUT (OR MS21042-5)

* REFERENCE ONLY. PARTS ARE INCLUDED IN D350-748-141/241 ASSEMBLIES ABOVE

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